Research project: **A**frica to **A**sia and **B**ack **A**gain: **T**esting **A**daptation in **F**lood-**B**ased **R**esource **M**anagement

First Knowledge and experience sharing of the water management practices of Flood Based Farming in Sudan

July 2 to 3, 2017, Elsimeh, North Kurdofan

Prepared by: *HRC-Sudan Team*

HRC SUDAN Hydraulics Research Center مركز البحوث الهيدروليكية

Spate Irrigation Network Foundation

META META

IFAD
Enabling poor rural people to overcome poverty

Brief Report on the Workshop Activities

I. Introduction

The 1st national workshop of the FBLS Sudan held in El Simeh town, North Kurdufan on 2-3 July 2017 has been a great success. More than 60 participants attended the workshop, including farmers and professionals from the four major flood based systems in Sudan namely Gash Agricultural Scheme, Delta Toker Agricultural Scheme, Khor Abu Habil Agricultural Scheme and Hud El Silem Agricultural Scheme. Academia, research, and private sectors also participated. The workshop opening was attended by two state ministers, and two governors of provinces.

The private sector actively participated in the deliberation of the workshop (Dan Fodio, Mahjoub Awlad).

The workshop was hosted by Khor Abu Habil Agricultural Scheme, who generously provided avenue, food and drinks during workshop days.

This workshop is part of the “Africa to Asia and Back Again: Testing Adaptation in Flood-Based Resource Management Project” which is being implemented by the Hydraulics Research Center (HRC-Sudan) in Sudan over the period 2015-2018 with financial support from IFAD and in collaboration with MetaMeta Research – The Netherlands (the leading partner).

II. Workshop goals

The overall goal of the workshop was to contribute to further build-up of the knowledge-base in Sudan on efficient management and productive use of floods as well as better position HRC and its key partners as the premium centres of research, training and capacity building in FBLS.

The three specific objectives were as follows:

- get insights of water management issues at K. Abu Habil Agri. Scheme and identify potential research areas which would improve performance of the system and increase water and land productivity.
- share knowledge of water management practices among the community of the different FBLSs in Sudan.
- strengthen the FBLS Network in Sudan.

III. Workshop participants

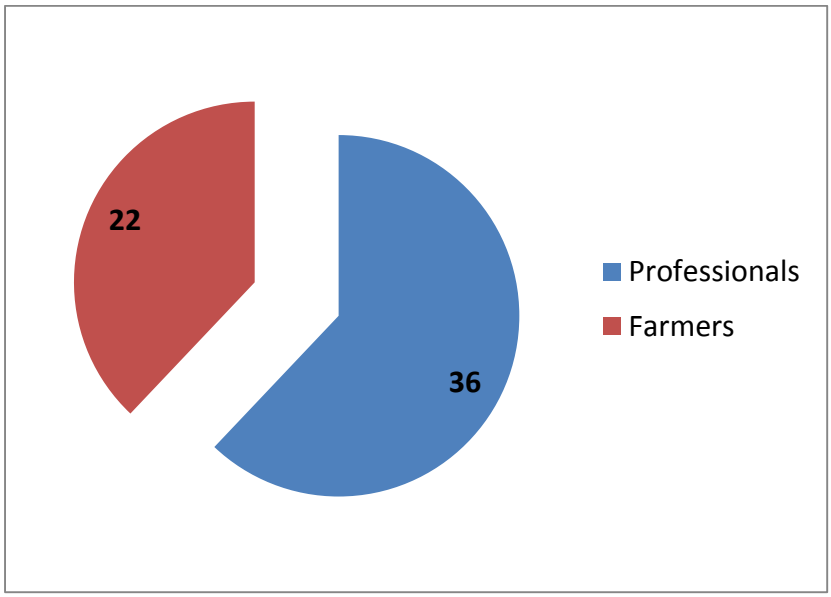
More than 60 participants have attended the workshop. For the first time, two farmers and one engineer from the flood basin farming system in northern Sudan attended spate network event. The list of participants is given in Annex 1. These include farmers and technicians from the four major spate systems in Sudan, namely: Gash Agricultural Scheme, Delta Toker Agricultural Scheme, Khor Abu Habil Agricultural Scheme, and Hud El Silem Agricultural Scheme. For the first time also, Academia from University of Sudan (Prof. Hassan Ibrahim), of the irrigation engineering attended a Sudan FBLS network event. Private sector, e.g., Company of Dan Fodio – branch of agricultural machineries attended as well. Governmental officials from North Kurdufan State, were actively present, including two state ministers and two province governors.

The table below has the details of the organisations and their representatives that actively contributed to the workshop.

Organization	Target group	No. of participants
MetaMeta/HRC-Sudan/MWRIE	Professionals	7
National administration – Elrahad Locality	1. Prince of El Gawamaa tribe 2. One Umda of El Simeh area 3. Two Sheikhs from El Simeh area	4
North Kurdofan State	Professionals: 1. Ministry of Agriculture 2. North Kurdofan University 3. Khor Abu Habil Scheme 4. Agricultural Research Corporation	15
Khor Abu Habil Scheme	Farmers	15
Gash Agri. Scheme	Professionals	2
	Farmers	3
Delta Toker Agri. Scheme	Professionals	1
	Farmers	2
Hud El Silem Scheme	Professionals	1
	Farmers	2

Others	Private sector	3
	Universities: Sudan University & Gezira University	2
	Donors: IFAD	1
Total		**58**

As shown in the figure below, farmers accounted for more than one-third of the total participants. This is remarkable, as the farmers had to travel long distances (more than 1200 km) to attend this workshop – it took for instance two days for farmers from Toker (along the Red Sea in the east), and from Silem close to Egyptian border in northern Sudan.



IV. Workshop program at a glance

The two-day workshop started with an opening session addressed by Mr. Elnoor Awad El Karim, Minister of Agriculture–North Kurdofan State, Prof. Yasir Abbas Mohamed, General Director of HRC-Sudan, Dr. Abraham

Photo 1: Opening session, in the middle, the minister to his right and left, Prof. Yasir and Eng. Mekki respectively

Mehari Haile, Principal researcher at MetaMeta Research and associate professor at HRC-Sudan, and Eng. Mekki Abdalla, Director of Khor Abu Habil Agricultural Scheme. The minister of energy, water and electricity attended the opening session, in addition to two governors from local provinces.

The opening session was also attended by a number of the national administration leaders and representatives of North Kurdofan State Government.

The first day has focused on presentations and discussions and the main theme was ‘knowledge and experiences sharing’. The day has started with highlights on the Africa to Asia project; its rationale and achievement. This was followed by presentations on research and evidence-based documentation results from across Sudan and beyond covering varied technical, management and governance topics. The final session of the day gave more insights into the hydrology, water resources, challenges and opportunities of the Khor Abu Habil Agricultural Scheme; detailed program is given in Annex 2.

Photo 2: Some of the workshop participants (Mr. Mustafa Osman from El Silem on the right is talking to Khalid, and Magzoub from Toker on the left)

On the second day, the main theme was ‘formulating relevant solutions-oriented research programme for Khor Abu Habil Scheme’. In the morning session, field visit was conducted to the main regulator and the main canal of the scheme extension in El Rahad. Also, Elrahad Turda (natural water depression) was visited. Also, the main canal at Elsimeh and some basins were visited. These sections of the scheme are expected to serve as specific research intervention areas. The afternoon session was

devoted to a moderated group discussion aimed at prioritizing the main research topics as summarized in the outputs section.

Three main questions guided the group discussion:

1. What are the key challenges hinder water management in Khor Abu Habil
2. Could these challenges be classified into different groups: new construction, O&M, research issues
3. What are the solution to address these challenges

Photo 3: Side of the field visit: main regulator on Khor Abu Habil (on the right) and the gates diverting water to the main canal feeding cultivated areas in El Rahad

Photo 4: Group two discussions

V. Main outcomes

The workshop participants collectively identified the main challenges that hinder water management in the Khor Abu Habil Scheme and proposed solutions.

1) Major challenges

1. The unstable Khor Abu Habil regime:
    - High flow variability and dynamic morphological phenomenon including change in river routes, bed instability characterized by frequent erosion and deposition.
2. Weed infestation and sediment deposition:
    - Several canals are heavily invested with weeds while sedimentation is a major problem in the canals and fields (it is estimated at 200-300 thousands m^3 per year).
3. Inadequate infrastructure and rehabilitation work:
    - Highly deteriorated diversion, distribution, control and conveyance irrigation infrastructure. The canal regulators (e.g. the Green El Rahad) are insufficient in number and are in bad shape.
    - Lack of irrigation water storage facilities that could to some extent have mitigated the impact of flow variability.
    - Lack of roads and bridges to facilitate movement of farmers.
4. Weak institutional set-up:
    - There is no clearly defined responsibilities and effective coordination mechanisms for water management.
    - The Khor Abu Habil irrigated area is planned to expand four-fold to about 60,000 feddans. The current institutional set-up can not cope with the water management needs of such large cultivated land.
5. Information, human resources, knowledge-gap:
    - Water allocation - lack of data/analyses of river supply, actual use and demand by the various competing needs (agriculture, horticulture, groundwater recharge, domestic ..).
    - Irrigation scheduling and planning is not optimum - the irrigation requirement and interval currently in practice need to be evaluated.
    - Light machines that can operate under wet conditions and perform tillage and other land preparation activities are yet to be pilot tested.
    - Shortage of skilled engineers and managers.

2) Suggested solutions

The proposed solutions can be read with reference to the order of the problems as mentioned above.

1. To study possibility of constructing storage facilities (small dams) for optimal use of Khor Abu Habil variable yield and to study appropriate river training methods for Khor Abu Habil.
2. To study weed infestation with regard to irrigation system, crops rotation, … in addition to investigation of applicable methods to reduce sedimentation in the scheme.
3. Evaluation of current condition of irrigation infrastructure of the scheme and investigation of possibility of adaptation of a new irrigation system with regard to the current sediment accumulation. Also, to
    - Study irrigation system in the Green El Rahad.
    - Rethink on the current irrigation infrastructure to cope with the expected expansion in the scheme area.
    - Build enough roads/bridges for beneficiaries/farmers' movement.
4. Strengthening of institutions involved in water use of Khor Abu Habil to even cope with the proposed expansion in the total scheme area to reach around 60,000 feddans.
5. Concerning information and human resources:
    - Establishment of reliable database of rainfall within the catchment and corresponding flow records.
    - Accurate determination of crop water requirements (CWR) of different crops for basin irrigation besides irrigation duration for these crops.
    - Availability of relevant machinery to the basin irrigation to enable planting in the optimum time.
    - It is highly a prerequisite to formulate an irrigation unit with qualified/well trained technical staff for the scheme.

Others:

1. Socio-economic study to study reasons of decrease in production.
2. Issuing of rules to prevent cutting of trees within the stream banks.
3. Detailed study of Khor El Jewsir for better use of its resources in increasing irrigated area.

As a conclusion, almost 80% of the identified problems need detailed studies and research investigation. However the matter of availability of qualified cadre especially for irrigation operations, this can be communicated with policy makers.

All participants agree on necessity of updating/applying researches to develop the performance of the scheme. All relevant institutions/organizations have to be on board. Much consideration has to be paid for strengthening institutional setup and water governance of Khor Abu Habil. Being a key factor, indeed availability of financial resources is prerequisite.

VI. General remarks

- The workshop has achieved its targets and there was marked interest from the administration body of Khor Abu Habil Agricultural Scheme and also from the North Kurdofan State Government
- As announced in the workshop closing, the next gathering will be held in Delta Toker Agricultural Scheme followed by a gathering in Hud El Silem Scheme
- Workshop participants were invited by the Minister of Agriculture – North Kurdofan State to a social evening in El Obied town
- Dan Fodio Company, a reputed private sector in Sudan, has proposed to support machineries for on farm water management (e.g., agricultural practices on wet soils)
- Graduate students from University of Sudan are encouraged to conduct research on Khor Abu Habil as announced by Prof. Hassan Ibrahim who has already supervised so many researches
- Good media coverage was done to the workshop activities by HRC communication person and media section besides few representatives of national and local media. An article on the workshop activities as reported in El Sudani newspaper is given in Annex 3. Some products will soon be added to the project web page under www.hrc-sudan.sd

Also, many issues were raised from the different spate systems; however some comments from workshop participants are listed as follows:

“Agriculture has to be based on economical vision”, Eng. Tariq (ARC – El Obied office)

“Such events are very important to gather political, academia, professionals and direct beneficiaries to be on the same page regarding the raised issues concerning development of flood based systems” Dr. Haroun (National administration in El Simeh area)

“There is no applied research to fully benefit from spate potentiality” Mr. Magzoub, farmer (Delta Toker Agri. Scheme)

“Machinery of simplified techniques has to be adopted in FBFSs” Eng. Sami, private sector

Annex 1: List of participants

الرقم	الاسم	الجهة	التلفون / الإيميل
1	د. هارون الطيب هارون	الإدارة الأهلية – أمير الجوامعة	CP: 0123311761
2	العمدة/ حامد دودية	الإدارة الأهلية	
3	العمدة/ عيسى كبر	الإدارة الأهلية	
4	الشيخ/ حنفي مكي الخليل	الإدارة الأهلية	
5	م. مكي عبدالله	مدير مشروع خور أبوحبل	0122245295
6	م. محمد جابر علي تاور	وزارة الزراعة – ش كردفان	
7	م. هند حسين جمعة النضيف	وزارة الزراعة – ش كردفان	
8	م. حماد دابر علي	وزارة الزراعة – ش كردفان	
9	م. بلال إبراهيم أحمد	وزارة الزراعة – ش كردفان	
10	السيد/ صالح آدم الفحيل	مشروع خ أبوحبل – مدير	
11	م. أحمد حسن الأمير	مشروع خ أبوحبل – مدير	
12	م. سالم عبد القادر محمد	مشروع خ أبوحبل الزراعي	
13	السيد/ بريمة حسن محمد	مشروع خ أبوحبل الزراعي	
14	السيد/ فتحي أحمد فضل الله	مشروع خ أبوحبل الزراعي	
15	م. خديجة	مشروع خ أبوحبل الزراعي	
16	م. محمد أحمد ميرغني	مشروع خ أبوحبل الزراعي	0123311761
17	السيد/ عبدالرحيم آدم عبدالله	المزارعون المنتجون	
18	د. إسماعيل أحمد إسماعيل	جامعة كردفان – الموارد	
19	د. محمد التوم الهجا	جامعة كردفان – الموارد	
20	م. طارق الطيب أحمد سليمان	البحوث الزراعية – الأبيض	
21	م. أحمد إبراهيم حماد	البحوث الزراعية – الأبيض	
22	السيد/ الصادق حسين	المزارعون المنتجون – السميح	
23	السيد/ عمر ميرغني عبدالله	المزارعون المنتجون – السميح	
24	السيد/ عبدالله التجاني بدوي	المزارعون المنتجون – السميح	
25	السيد/ محمد علي سعيد	المزارعون المنتجون – السميح	
26	السيد/ إبراهيم أحمد النور	المزارعون المنتجون – السميح	
27	السيد/ آدم دفع الله المليح	المزارعون المنتجون – السميح	
28	السيد/ حسن آدم جمعة	المزارعون المنتجون – السميح	
29	السيد/ أحمد إبراهيم أبوجودة	المزارعون المنتجون – السميح	
30	السيد/ كباشي خليفة	المزارعون المنتجون – السميح	
31	السيدة/ شامة محمد الشريف	المزارعون المنتجون – السميح	
32	السيد/ عثمان عبدالرسول عامر	المزارعون المنتجون – الرهد	
33	السيد/ عبدالمطلب خليل البدوي	المزارعون المنتجون – الرهد	
34	السيد/ أحمد خليفة عبدالله	المزارعون المنتجون – الرهد	
35	السيد/ محمد علي آدم أبكر	المزارعون المنتجون – الرهد	
36	م. عمر علي عثمان	مشروع دلتا طوكر – نائب	0915011336
37	السيد/ خالد عثمان	مشروع دلتا طوكر – مزارع	

38	السيد/ مجذوب علي أبوعلي	مشروع دلتا طوكر – مزارع	
39	م. مصطفى عثمان عبد الرحمن	مشروع حوض السليم – المدير	0128355615
40	السيد/ عبدالله سيد محمد	مشروع حوض السليم – مزارع	
41	السيد/ إدريس خيري فقير	مشروع حوض السليم – مزارع	
42	م. محمد عبدالله أحمد	مشروع القاش الزراعي	0912411785
43	م. محمد عبد القادر شنان	مشروع القاش الزراعي	0914055533
44	السيد/ أحمد محمد عمر	الروابط – مشروع القاش	
45	السيد/ برير أدروب	الروابط – مشروع القاش	
46	السيد/ أحمد علي	الروابط – مشروع القاش	
47	السيد/ عمر محمد آدم	الروابط – مشروع القاش	
48	ب. حسن إبراهيم	جامعة السودان	0912645200
49	د. التجاني النور بشير	جامعة الجزيرة	0908668275
50	م. عبد الوهاب محمد	وحدة تنفيذ السدود	0962380009
51	م. سامي حسن	قطاع خاص	
52	د. فريد التوم	قطاع خاص	0912356632
53	السيد/ طارق أمين أبوالبشر	منظمة إيفاد	
54	السيد/ النعيم أحمد عبدالله	محجوب أولاد – قطاع خاص	

HRC-Sudan and MetaMeta staff:

الرقم	الاسم	الجهة	التلفون / الإيميل
1	ب. ياسر عباس محمد	مركز البحوث الهيدروليكية	0916120615
2	أ مشارك. أبوعبيدة بابكر أحمد	مركز البحوث الهيدروليكية	0123813813
3	د. أبراهام مهاري هايلي	MetaMeta / HRC-	
4	م. أميرة عبدالرحيم عبدالقادر	مركز البحوث الهيدروليكية	0915010681
5	م. هناء التوم	مركز البحوث الهيدروليكية	0904680008
6	م. أبوبكر محمد	مركز البحوث الهيدروليكية	0919883310
7	أ. تهاني جاد الله	مركز البحوث الهيدروليكية	0118721856
8	إعلامي	قناة S24	
9	(4) سائق	مركز البحوث الهيدروليكية	

Annex 2: Workshop program

Time	Topic	Speaker	Chair/Reporter
Day 1: 2nd July 2017			
8:30-9:00	Registration		Prof. Yasir Abbas
9:00-9:20	Welcoming Remarks	Prof. Yasir Abbas, Eng. Mekki Abdalla	
9:20-9:40	Official Opening	N. Kurdofan State representative	
9:40-10:00	Overview of the Africa to Asia & Back Again project in Sudan: Achievements, challenges and plans ahead	Eng. Amira Mekawi	
10:00-10:30	***Refreshments***		
Session 2: Research results, knowledge & experience sharing from across Sudan & beyond			
10:30-10:50	Water harvesting methods and practices in Sudan	Eng. Abdel Wahab Mohamed	Dr. Eltigani
10:50-11:10	Floodwater governance: lessons from Gash Agricultural Scheme (GAS), Sudan	Assoc. Prof. Abu Obieda Babiker	
11:10-11:30	Improved water allocation in GAS - main research findings, conclusions and recommendations	Eng. Hana Eltom	
11:30-11:50	Good technical and management practices in FBLS: experiences from across Africa and Asia	Dr. Abraham Mehari	
11:50-12:30	Discussions	Participants	
Session 3: Insights into Khor Abu Habil Scheme			
12:30-12:50	Khor Abu Habil Agri. Scheme: achievements, problems, anticipated solutions and future	Eng. Mekki Abdalla	Dr. Abraham/Assoc. prof. Abu Obieda
12:50-13:10	Hydrology and water resources of Khor Abu Habil	Prof. Yasir Abbas	
13:10-13:30	Institutional aspects - local government and WUAs: achievements and constraints	Dr. Tigani Elnoor	
13:30-14:10	Overview on researches carried out in K. Abu Habil Agri. Scheme	Prof. Hassan Ibrahim	
14:10-15:00	***Lunch & Prayers***		
Session 4: Sharing experiences			
15:00-15:20	WUAs: achievements and constraints in K. Abu Habil Agri. Scheme	WUAs	Dr. Abraham/Assoc. prof. Abu Obieda
15:20-15:40	Sharing experiences	Farmers (GAS, Abu Habil, Toker, Silem)	
15:40-16:10	Discussions & Wrap up	Participants	

Time	Topic	Remarks
Day 2: 3rd July 2017		
8:00-12:00	Field visit will cover irrigation system infrastructure of the scheme (head regulators at Elsemeh and Rahad), to field, probably to Rahad Turda	Eng. Mekki Abdalla

Afternoon session: Formulating research programme for Khor Abu Habil Scheme		
12:00-12:20	Outline of research topics/themes	Prof. Yasir Abbas
12:20-13:00	Group discussions – prioritizing the research topics/themes	Participants
13:00-13:30	Wrap-up and reception	HRC-Sudan

Annex 3: Media coverage of El Sudani newspaper

مقترح بخارطة طريق لشبكات الرّي الفيضي

الأبيض: عمران الجميعابي

دعا مدير مركز البحوث الهيدرولوكية بوزارة المائية، بروفيسور ياسر عباس لوضع رؤية علمية للاستفادة من المياه بإدارة مُثلى، موضحا استخدام الرّي الفيضي في السودان بنهر عطبرة وبركة وخور أبو حبل.

ولفت عباس في ورشة:(تبادل الخبرات لإدارة مُثلى للمياه بمشاريع الرّي الفيضي بالسودان)، بمنطقة السمح رئاسة مشروع خور أبو حبل بولاية شمال كردفان، بتمويل من الايفاد ومنظمة (meta meta) الهولندية، لفت إلى أن الورشة تهدف للتعرف على مشكلات إدارة المياه بمشروع خور أبو حبل وتحديد البحوث لتحسين الأداء وزيادة الإنتاجية.

وكشف وزير الزراعة بشمال كردفان النُّور عوض الكريم، أن اتجاه ولايته بالتعاون مع الشركاء لإجراء دراسات لمسح جوي، للاستفادة من أكبر المساحات وإدخالها بمشروع خور أبو حبل، والتي قدّرها بنحو ٣٠٠ ألف فدان مع الاستفادة من المياه الجوفية، واصفا مشروع خور أبو حبل بالاستراتيجي، وتتدفق منه مياه بمقدار ١٠٠ مليون. م. م.

وأشار مدير مشروع خور أبو حبل مكي عبدالله، لتعويل إدارة المشروع على مخرجات الورشة لمعالجة مشاكله.

وأوصت الورشة بوضع خارطة طريق لتقوية شبكات الرّي بمشاريع الرّي الفيضي، خاصة بمشروع خور أبو حبل وايجاد وحدة متخصصة للرّي، وإجراء دراسة لايجاد أكثر من منظم في المشروع الذي يعتمد على منظم واحد.

وتطرّقت الورشة لعدد من الأوراق حول:(حصاد المياه بالسودان الطرق والأساليب)، و(الأساليب الجيدة لنظم الرّي التي تعتمد على الفيضانات) وغيرها.

بالعاصمة

في حالات الانخفاض يتجهون لسوق
ا إلى أن هذا النوع من التعامل تسبب
تفاع أسعار العقارات.

البيع بالجنيه

عقارات بشرق النيل، لارتفاع أسعار
في الفترة الأخيرة للطلب العالي من
والنازحين للسكن بالمنطقة، وحدوث
فة في أسعار الأراضي بدار السلام
قال لـ(السوداني) إن عمليات الشراء
الجنيه في هذه المناطق عموماً، عدا
تباع عقاراتها وأراضيها بالدولار.

ار بحري يشكون
تردي البيئة

لوم بحري: عبير
تجار الخضر ببحري من تردي
البيئي خاصة مع موسم الأمطار،
و لـ(السوداني)، لتكدس النفايات
وخارج السوق مما يصعّب على
والمتسوّقين المرور بالشارع،
ن موظفي النفايات يحصلون
رسوم من التجار دون مقابل،
(٤٢) جنيه شهريا.

Annex 4: Workshop photographs

Day one:

Photo 1: Workshop participants

Photo 2: Side view of workshop participants

Photo 3: Presentation by Dr. Abraham and experiences on management of FBS

Photo 4: Presentation on Khor Abu Habil Scheme by Eng. Mekki

Photo 5: Side view of the social evening: invitation by the Minister of Agriculture

Photo 6: Side view of the social evening: interactions between participants

Day two:

Photo 7: Speech on El Rahad Turda by Dr. Haroun

Photo 8: Side view from El Rahad Turda

Photo 9: Workshop participants during field visit

Photo 10: Participants during field visit

Photo 11: Female participants during field visit

Photo 12: Discussions of the four working groups during the closing session